

Recent improvements to the Airborne Visible/Infrared imaging Spectrometer (AVIRIS)

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Recent improvements made to the Airborne Visible/infrared Imaging Spectrometer (AVIRIS) since 1994 include all new focal plane arrays, a new analog and digital signal chain, which incorporates end-of-line dark current summing, and a radiance feedback controlled onboard calibration lamp. The new focal planes consist of a custom designed buffered direct injection multiplexer. Features of the focal planes include application in each unit cell, simultaneous acquisition of all spectral channels, more appropriate anti-reflection coatings, and rectangular detector elements for the 1.8 to 2.5 micrometer spectrometer. The analog signal chains are adapted from a commercial infrared array camera and incorporate 12 bit digitization and non-uniformity correction. A new digital signal chain was designed to handle the 12 bit wide data path. The design uses programmable gate array logic for all timing signals and computes the sum of sixty four shuttered detector samples during scanner flyback. The circuit that controls the onboard calibration lamp has been modified to stabilize the radiant output. A narrow-band filtered silicon photodiode tuned to 570 nanometers is used to minimize sensitivity to temperature. The results of these modifications is a two to three times increase in signal-to-noise ratio across the spectrum, no detectable coherent noise, elimination of digital noise spikes, elimination of the requirement for spectral re-sampling, and greatly reduced dark-current noise.

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